



Northern Lights create a spectacular display in the Arctic

#### 9 Federal Agencies in the SEARCH Partnership:

NOAA  
National Science Foundation  
Department of Defense  
NASA  
Department of Energy  
EPA  
Smithsonian  
Department of the Interior  
US Department of Agriculture



A polar bear has to trek across shifting ice in its ceaseless quest for food; ice serves as an effective camouflage for these creatures.

## FY 2003 President's Request

### SEARCH

#### Study of Environmental Arctic Change

#### What is requested?

NOAA requests an increase of \$2.0 million and 2 FTE in FY2003 to begin its portion of a coordinated interagency and international study that will improve observation of aspects of the Arctic environment. This research could significantly impact national energy budgets, weather, fisheries, and climate on both long and short term time scales. The activity responds to recent evidence that the Arctic environment may be in a state of precipitous change, and that the changes may have far reaching effects on lower latitudes through two mechanisms: (1) the planetary thermohaline circulation (ocean currents) which is subject to change through melting of the ice pack and glaciers, and (2) the Arctic Oscillation/North Atlantic Oscillation (large scale atmospheric mode) which may be a critical component in the manifestation of global warming.

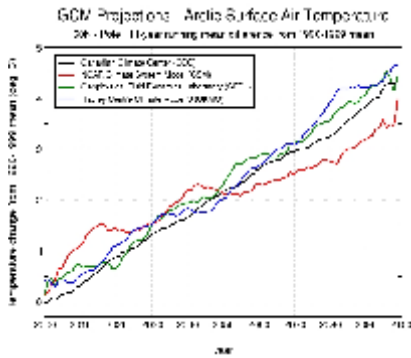
Climate change in the Arctic could cause major perturbations in the global environment. Nine federal agencies, therefore, have agreed that an intensive interagency effort of observations and analysis is needed to understand the changes in the Arctic, their relation to the rest of the globe, and their impact on society. These are the goals of SEARCH.

#### Why do we need it?

Scientists investigating the Arctic environment have been able to collect significant new data in recent years because of improved access to the central Arctic Ocean, new technologies, and better agency and international cooperation. With these new data, researchers sponsored by several federal agencies have noted a number of unexpected changes in the Arctic. These changes are unlike anything measured in the past 100 years, and the observations indicate that they may be related to each other and to the continuing lower pressure mode of the Arctic Oscillation (AO).

For example, winter temperatures throughout much of the Arctic are much warmer now. The spring thaw of ice is occurring up to two weeks earlier at Barrow, Alaska; there is evidence of a 40% decline in Arctic sea ice. Climate models are projecting continued warming of the Arctic for the next 100 years. Computer models predict extensive loss of Arctic sea ice, perhaps with an ice-free summer in only 50 years. Yet we have practically no observations of sea ice thickness to track changes in ice volume.

#### What will we do?



Climate models are predicting continued warming in the Arctic for the next 100 years.



Ice on Cross Island, off the Northern coast of Alaska



Buoy drifting in ice



#### For information:

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NOAA will use the funding to build and deploy four buoys, purchase and deploy upper atmosphere monitoring instrumentation, and identify researchers through a competitive proposal process to conduct re-analyses of existing satellite data. The agency will enhance the International Arctic Buoy Program to provide critical new data on sea ice thickness to track changes in sea ice in a period of rapid change in the Arctic. NOAA will also enhance atmospheric observations, especially of the upper atmosphere, to more completely observe the dynamics of the Arctic Oscillation and improve predictions of weather and climate over North America. NOAA's existing satellite data will be re-analyzed to provide continuity across the different sensors used over the past few decades. Up-to-date understanding of Arctic climate processes will be added to regional and global climate models to support reanalysis of the satellite data, along with all other available Arctic atmospheric data. The resulting Arctic reanalysis data set will be the reference standard for climate research in the Arctic.

#### What are the benefits?

Enhancement of the International Arctic Buoy Program will support assessment of changes in ice volume, ice/albedo feedback and planetary thermohaline circulation; monitor the increased availability of northern sea routes; and provide Arctic oceanographic information critical to NOAA management of high latitude fisheries, marine mammals, and protected species.

There are fewer weather stations in the Arctic now than in the 1960s. Enhanced circum-Arctic observations of the atmosphere will provide information on the existence, intensity and impact of the Arctic and North Atlantic oscillations. These will be particularly important in improving annual temperature and hydrologic forecasts for the U.S. that will impact national water and energy concerns.

Re-analysis of existing data, especially satellite data, is a cost-effective way to describe changes that have occurred in the Arctic over the past 40 years, and to develop regional and global climate models that accurately reproduce past climate variability, and presumably forecast future variability.

Re-analyzed data sets for the Arctic will be used to identify decadal changes in atmospheric temperatures, precipitation, snow cover, ice extent and skin temperatures. This will allow development of climate change scenarios and linkages between the Arctic and lower latitudes, in particular for the continental U.S.

#### NOAA Budget

Oceanic & Atmospheric Research  
SEARCH

FY2003 Change  
\$ millions

\$2.0

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